NOTES ON THE GROWTH OF ULVA AS A FUNCTION OF AMMONIA NITROGEN

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Research on Ulva latissima is being carried out at NOrtheastern University's Marine Science Center under the direction of Dr. Nathan P. Riser. The research is part of a study to investigate the effects of water pollution on marine ecology.

The equipment utilized in the study (Fig. #1) is designed to maintain environments of different ammonia nitrogen concentrations. All other factors such as light, phosphorous and temperature are held constant. The artificial lighting used consists of both incandescent and fluorescent sources. The fluorescent light source is a special plant grow-type bulb with most of its energy in the range of 650 mμ. The entire lighting system is on a cycle of 12 hours light, and 12 hours darkness.

Samples of Ulva latissima were cut at random from various parts of thalli of different pieces of Ulva. The samples were cut out with a 3/4" diameter cork bore. These circular pieces were then sewn to slate blocks which were then placed in the pans containing ammonia and sea water. As is noted in Fig. #1 the entire system is a flow through set up. The chemical feed pump delivers set concentrations of ammonia nitrogen at predetermined rates. This flow is balanced with the flow of sea water in the mixing tanks. The result is a constantly flowing system producing

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concentrations in the sample pans varying from 0.4 mg/l to 1.2 mg/l. It was felt that this open system would give more useful information than a closed culturing experiment.

Three experiments each of 40 days duration have been completed. The first and second runs were begun in August and October with water temperatures of 65° and 60° F. Growth of the plants was measured in vegetative growth only, and the high water temperatures during the runs caused most of the samples to become reproductive. This made results reported as vegetative growth difficult to understand, because as the Ulva reproduced the thallus degenerated.

The third run has just been completed and offers the most understandable results. Water temperatures during this last test remained close to 55° F, thus all the samples, exhibited only vegetative growth. Fig. #2 shows the results obtained. It is interesting to note the apparent peak of growth at 0.7 mg/l ammonia nitrogen. The growth of ULva in the pans containing ammonia nitrogen in concentrations greater than 0.7 mg/l exhibited considerably slower growth. The decrease in growth after 0.7 mg/l appears to be dependent on the amount of ammonia nitrogen as does the increase in growth up to 0.7 mg/l.

It should also be noted that this peak is probably dependent on the phosphate concentration. The phosphate as measured by the Stannous Chloride Method is 0.4 mg/l in all the pans. Chlorides were determined to be 19,200 mg/l in the water coming to the marine station. Further research is now

being carried on to determine both the relation of this ammonia peak to phosphate concentrations, and the relationship between nutrients, temperature and reproductivity.

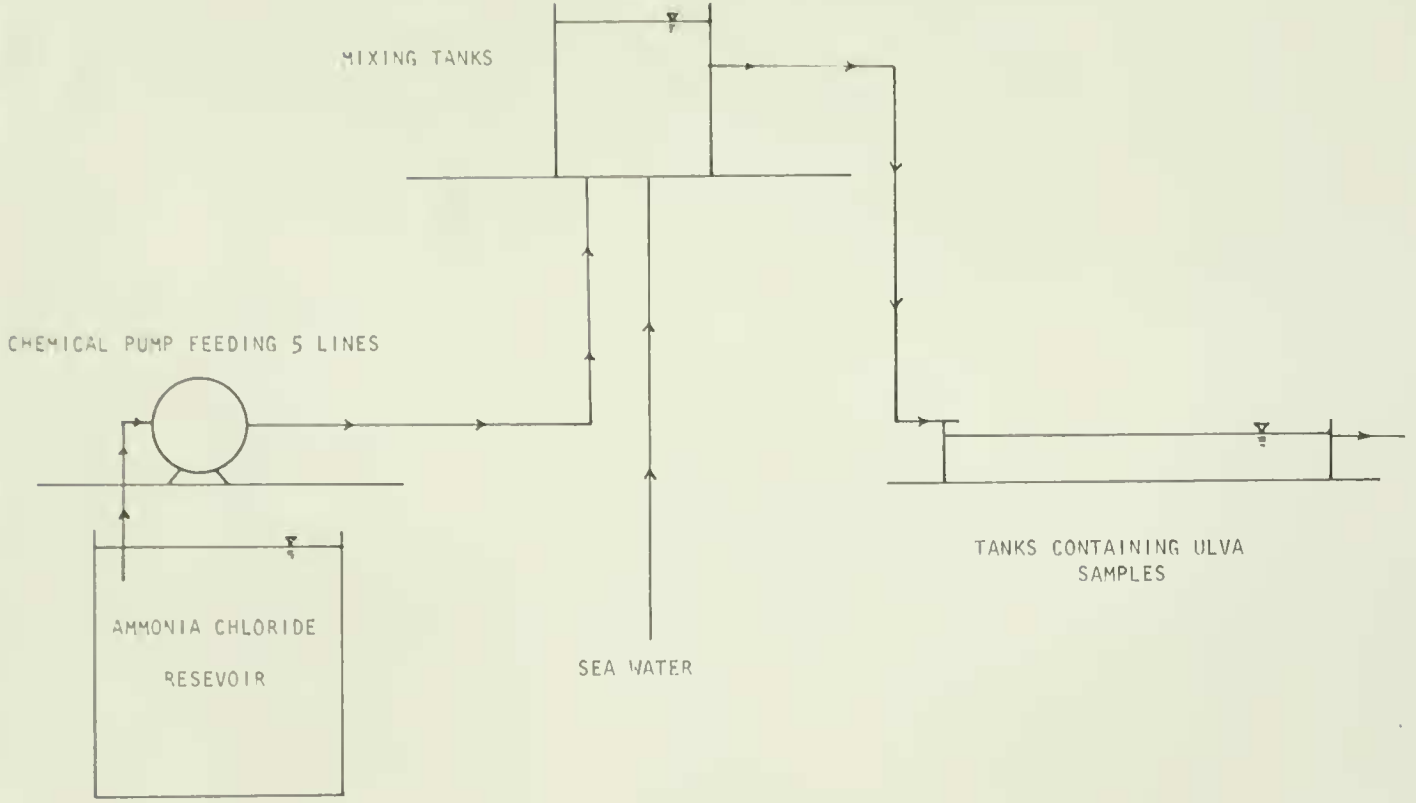

FIGURE #1

EQUIPMENT SET-UP FOR GROWING ULVA LATISSIMA AT DIFFERENT CONCENTRATIONS OF AMMONIA NITROGEN

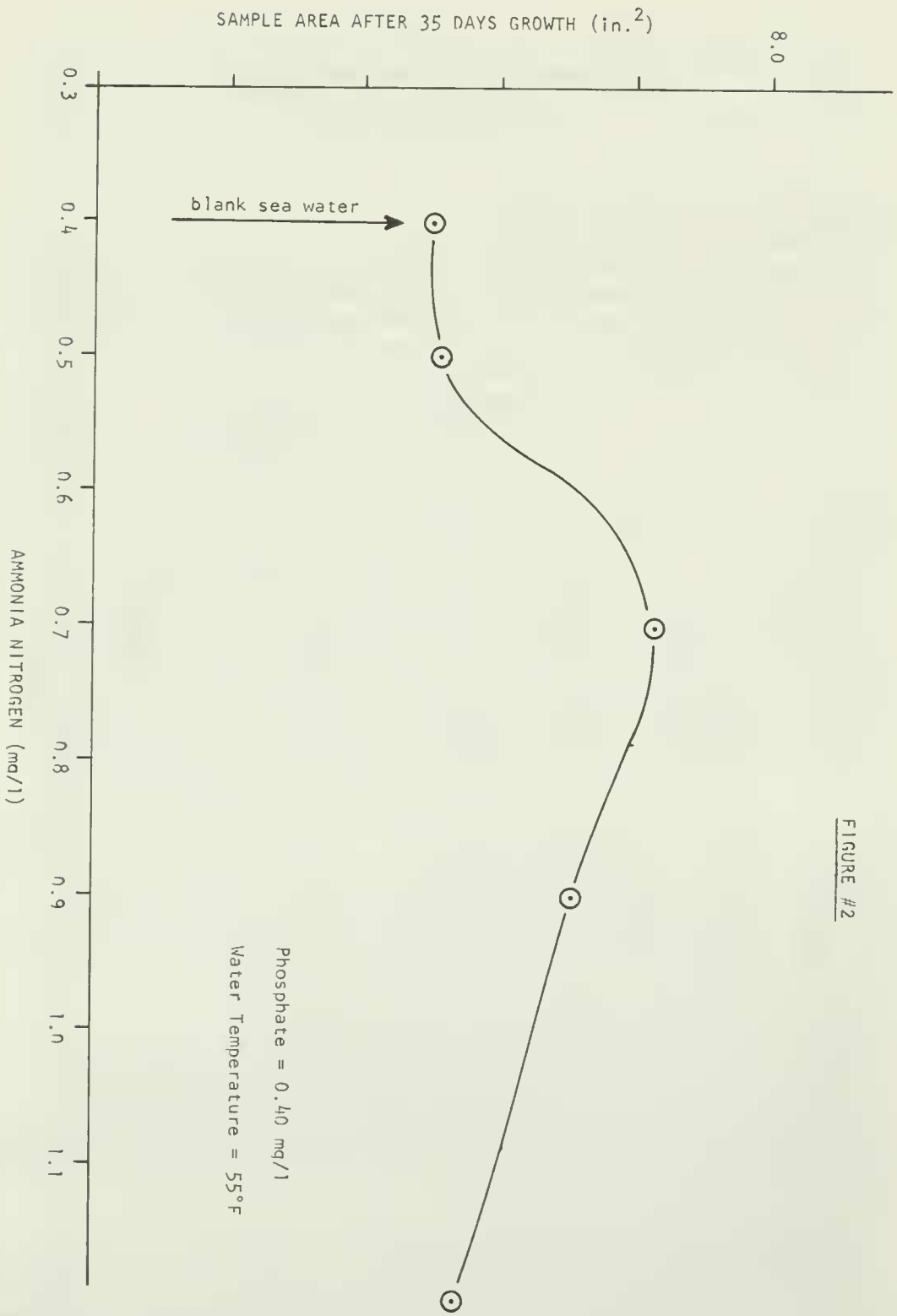
SAMPLE AREA AFTER 35 DAYS GROWTH (in.^{2})
0.3
8.0
blank sea water
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
AMMONIA NITROGEN (mg/l)
Phosphate = 0.40 mg/l
Water Temperature = 55°F

FIGURE #2